DECEMBER 1980 • $3.00 PER COPY

Petroleum Engineer INTERNATIONAL

OLD FIELDS: AN AREA OF PROMISE

Gulf Coast Reserves Hiked, p. 21

Pennsylvania's Drilling Pads, p. 30

Massive Fracs With Foam, p. 24

Calculators Aid Optimized Drilling—Part 3, p. 52

THE INTERNATIONAL MAGAZINE OF METHODS FOR ENGINEERING/OPERATING PEOPLE

Drilling Continues At Record Pace

With drilling activity in the U.S. increasing at a rate that already is stretching the limits of the accompanying graph, chances are good that the annual average of rotary rig activity will top 2,900 this year for the first time ever.

This would be almost 215 rigs above the previous high of 2,686, set back in 1955.

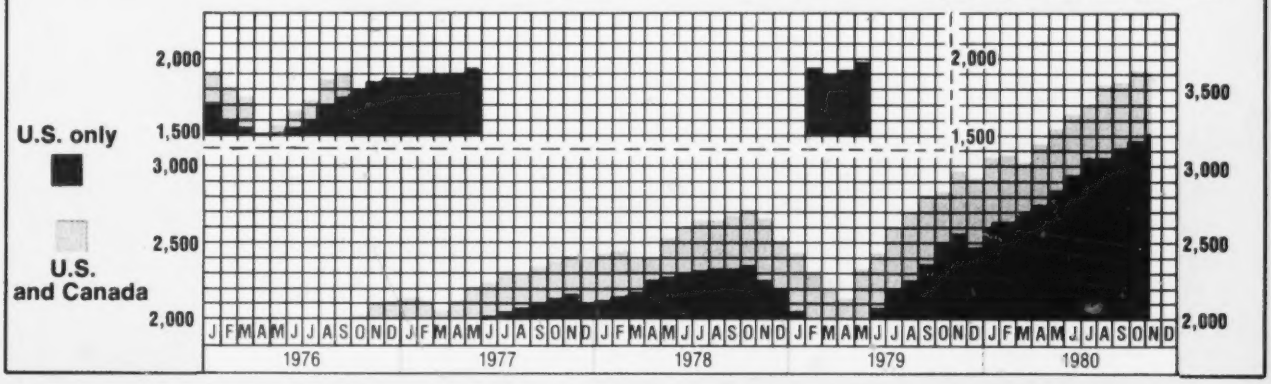
The weekly average this year has been ahead of the 1955 mark since mid-June, and the average count for the second half of 1980 has been 3,088 rigs turning each week.

Canadian activity also is setting records, but they may be short-lived in the face of Ottawa's apparent energy death wish. Some observers are of the opinion that Canada's new energy proposals indicate the country has given up on its goal of energy independence by 1990.

Rotary Rigs Actually Making Hole In United States & Canada

As Reported to International Association of Drilling Contractors by Hughes Tool Company

	Oct. 20, 1980	Oct. 27, 1980	Nov. 3, 1980	Nov. 10, 1980
Alabama	14	15	14	13
Alaska				
Land	9	8	12	13
Offshore	1	1	1	2
Arkansas	30	32	33	31
Arizona	2	2	3	2
California				
Land	109	103	105	106
Offshore	18	19	19	21
Total	127	122	124	127
Colorado	81	76	75	72
Florida	4	4	4	4
Hawaii	1	1	1	1
Idaho	1	1	1	1
Illinois	30	24	24	24
Kansas	153	145	147	148
Kentucky	2	2	3	3
North Louisiana	59	60	58	56
South Louisiana				
Inland Waters	82	80	79	73
Land	170	178	168	170
Offshore	135	136	146	150
Total	446	454	451	449
Michigan	31	34	33	30
Mississippi	56	51	55	58
Montana	57	58	68	50
Nebraska	13	17	16	21
Nevada	7	6	6	5
New Mexico	119	122	120	124
New York	6	7	7	8
North Dakota	83	86	79	85
Ohio	89	90	84	83
North Dakota	83	86	79	85
Ohio	89	90	84	83
Oklahoma	441	449	454	462
Oregon	1	1	1	1
Pennsylvania	37	37	38	38
Rhode Island—				
Offshore	2	2	2	2
South Dakota	2	2	2	2
Tennessee	1	1	1	1
Texas—				
Offshore	70	72	72	75
Dist. 1	38	40	42	45
Dist. 2	56	60	60	58
Dist. 3	179	188	189	182
Dist. 4	104	103	99	103
Dist. 5 & 6	126	125	124	126
Dist. 7B	91	98	97	95
Dist. 7C	67	72	74	78
Dist. 8	120	112	126	117
Dist. 8A	77	75	76	78
Dist. 9	66	74	74	72
Dist. 10	55	60	61	53
Total	1049	1079	1094	1082
Utah	54	51	54	55
Virginia	2	2	2	2
Washington	1	1	1	1
West Virginia	46	43	42	35
Wyoming	166	163	158	174
Total U.S.	3164	3189	3210	3209
Western Canada	410	426	417	411
Eastern Canada	8	8	8	2
U.S. and Canada	3582	3623	3635	3622


U.S. only
U.S. and Canada
2,000
1,500
3,000
2,500
2,000
3,500
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1976
1977
1978
1979
1980

PETROLEUM ENGINEER INTERNATIONAL • 800 Davis Building • Dallas, Texas 75202 • **TWX** 910-861-9306

Abbott Sparks	President
John G. Grant	Publisher and Vice President
W. B. Bleakley	Editor
Richard D. McNally	Associate Editor
Steven D. Moore	Technical Editor
Mary Jane Ellis	Assistant Editor
Laura Jacobus	Assistant Editor
Edna Taylor	Editorial Assistant
J. E. (Hank) Kastrop	Consulting Editor
Renn Rothrock, Jr.	Consulting Editor
Ernestine Adams	Editor, Energy Management Rpt.
Julie Fonner	EMR Assistant Editor
Gregory Martin	Editor, Energy News / Energy Week
Sharon Hutcheson	Editorial Assistant

Alan Hilton	Service R&D Manager
Denise Tevis	Service R&D Department
Diane Mosman	Reader Service

ADVERTISING SALES OFFICES

EASTERN: Richard Martin, P.O. Box 89, Tennent, New Jersey 07763, (201) 446-3230

CHICAGO 60646: Bill Facinelli, Dwain Holmgren 4761 West Touhy Ave., Lincolnwood, Illinois, (312) 679-1100

OHIO, WESTERN PA.: Dwain Holmgren, 4761 West Touhy Avenue, Lincolnwood, Illinois (312) 679-1100

LOS ANGELES 91106: Bruce Berkey, 61 S. Lake Ave., Box 4566, Pasadena, Calif., (213) 681-0685.

HOUSTON 77027: Jess Adkins, Vice Pres., Gulf Coast Regional Manager, **Barry Bikin, Hal Odum,** 4151 Southwest Freeway, Suite 115, (713) 626-7850

DALLAS 75202: Ed Sealey, 800 Davis Bldg., (214) 748-4403, TWX 910-861-9306

WEST TEXAS: Rusty Meador, P.O. Box 811, Eldorado, Texas 76936 (915) 853-2689

UNITED KINGDOM, NETHERLANDS, SCANDINAVIA: Bryan Clark, Energy Publications, Div. HBJ, 24/28 Oval Road, London NW1 7DX, England, (01) 485-7074 (OR 7075). Cable: HARBREX, London NW1; Telex: 25775

FRANCE, ITALY, BELGIUM, SWITZERLAND: Gerard Lasfargues, 32, rue Desbordes Valmore, 75016-Paris, France. Telephone: 504 97 94

JAPAN: Masby Yoshikawa, Orient Echo, Inc., 11th Floor Sankyo Bldg., 7-12 Tsukiji 2-chome, Chuo-ku, Tokyo, Telephone: 541-4923, Cable: MYORIENTECHO

GERMANY, AUSTRIA: S.I.P.A.S., **Wm. J. M. Sanders, Paul J. Verbunt,** Raadhuisstraat 24, P.O. Box 25, 1484 EN Graft-de Ryp, Holland, Telephone 02997-1303 and 3660. Telex: 13039 sipas nl, Telegrams: SIPAS-Amsterdam

Jane Dietz	Production Department Manager
Don Fickert	Graphics Director
Janell Fowler	Production Manager
Debbie Cooper	Production Coordinator
Dennis Howard	Presentation
James Duke	Presentation
Victoria Valentin	Presentation
Laura Page	Presentation

Gary Hogan	Business Manager
Jack Schabel	Circulation Director
Royal Courtney	Circulation Fulfillment Manager
Gary Rothell	Classified Advertising Manager

ENERGY PUBLICATIONS

• a Division of Harcourt Brace Jovanovich •

P.O. BOX 1589 • 800 DAVIS BUILDING
DALLAS, TEXAS 75221 • (214) 748-4403

PETROLEUM ENGINEER INTERNATIONAL
Pipeline & Gas Journal
Energy Management Report
Energy News • Energy Week

HBJ A HARCOURT BRACE JOVANOVICH PUBLICATION

ABP ABC

EDITORIAL ADVISORY COMMITTEE

Lloyd E. Elkins, Petroleum Consultant
Bennie L. Franks, President, Sun Texas Co.
Dennis E. O'Brien, Technology Section Head, Exxon Chemical Company
B. R. Jones, President, Eagle Production and Drilling Co.
Frank Schuh, Director of Engineering Development, ARCO Oil and Gas Co., a Division of Atlantic Richfield Co.
Marius J. Mes, Senior Research Scientist, Production Research Department, Conoco Inc.

PETROLEUM ENGINEER INTERNATIONAL (USPS 429-380) published 15 times each year, monthly plus March 15, July 15 and November 15, by Energy Publications Division, Harcourt Brace Jovanovich, P.O. Box 1589, Dallas, Texas 75221.

December, 1980, Volume 52, No. 15.Copyright© 1980 by Harcourt Brace Jovanovich, Inc. All rights reserved. No part of this publication may be transmitted or reproduced in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher. Subscription rate to personnel employed by companies involved with exploration, drilling, production, or field processing of oil or gas: one year $12.00, two years $18.00, three years $24.00 for North, Central, and South America. Outside North, Central, and South America: one year $25.00, two years $35.00, three years $45.00. Subscription rate for all others: $25.00 for one year. Single copy price $3.00. Entered as second class mail matter January 15, 1949, at the post office in Dallas, Texas, under the act of March 3, 1879. Microfilm copies are available through University Microfilms, Inc., 313 North First Street, Ann Arbor, Michigan. Indexed by Applied Science, Technology Index and the Engineering Index, Inc.

Postmaster: Send address changes to PETROLEUM ENGINEER INTERNATIONAL, P.O. Box 1589, Dallas, Texas 75221, USA.

HARCOURT BRACE JOVANOVICH PUBLICATIONS

ROBERT L. EDGELL, Chairman; RICHARD MOELLER, President; LARS FLADMARK, Executive Vice President; ARLAND HIRMAN, Treasurer; JOE BILDERBACH, Vice President; JAMES GHERNA, Vice President; GEORGE GLENN, Vice President; THOMAS GRENEY, Vice President; EZRA PINCUS, Vice President; HARRY RAMALEY, Vice President; LOIS SANDERS, Vice President; ABBOTT SPARKS, Vice President. OFFICES: 757 Third Avenue, New York, N.Y. 10017. Phone: (212) 888-4444; 1 East First Street, Duluth, Minnesota 55802. Phone (218) 727-8511. 111 East Wacker Drive, Suite 1730, Chicago, Ill. 60601. Phone (312) 938-2300.

ABOUT THE COVER: Control-van view of a massive hydraulic fracturing operation in East Texas is used through courtesy of Halliburton Services.

NEXT MONTH: Development drilling is accounting for more than 75% of the wells being completed in the U.S. this year, and that will be the topic of our January issue.

Petroleum Engineer® INTERNATIONAL

The international magazine of methods for engineering/operating people

DECEMBER 1980 NUMBER 15 VOLUME 52

OLD FIELDS: AN AREA OF PROMISE

Amoco Hikes Production, Reserves In Texas Gulf Coast Fields 21
by W. B. Bleakley, Editor

Mitchell Energy Foam Fracs Tight Gas Zones 24
by W. B. Bleakley, Editor

Central Treating Location Solves Logistics And Environmental Problems 30
by D. Coleman and D. Miller, Red Valley Enterprises, and H. W. Bonner, Dowell

Silica Flour — Mechanism for Improving Cementing Compositions 43
A report from the User Subcommittee, API Standardization Committee 10

Hand-Held Calculators Augment Optimized Drilling Programs — Part 3 52
by Ben Siegel, Delta Drilling

Modern Production Risers — Part 3 66
by George W. Morgan, Engineering Consultant

George Williams Discusses UKOOA And North Sea Operations 80
Interview with the director-general of the UK Offshore Operators Association

Foamed Acid Stimulation Of Old Wells 96
by William G. F. Ford, Halliburton Services

Petroleum Engineering Quiz 104
Guest professor is Chapman Cronquist, Consultant

ENERGY management report™
by Ernestine Adams

	EM
Comment	1
Energy World Report	2
Profits Outpace Revenue Gains	4
Financial Notebook	7
New Products	9

EDITORIAL DEPARTMENTS

News Hi-lites *Significant Happenings in Petroleum*	1	Drilling/Exploration *Canada's East Coast Potential*	114
Course of Oil *It's Sunday Night*	6	Industry Meeting Calendar	122
Technology Trends *Forecasts from Current Events*	8	Petroleum Profiles *Five Minutes with Bennie Franks*	124
Offshore Technology *DSDP Studies North Atlantic*	10	Professional Directory	128
Continuous Tables	105	Classified Advertising	131
Company News	109	Index to Advertisers	EM 12

Profits Outpace Revenue Gains

Though third-quarter earnings of 77 oil firms rose less than the rate of inflation compared to same 1979 quarter, nine-month earnings rose 41% — more than revenues rose. Profit edged up to 6.1¢ of each dollar of sales for the total group, compared to 5.9¢ in same 1979 period.

Higher oil/gas prices led to greater profits from production. Most majors reported lower chemical earnings in third quarter, linked to recessionary drop in demand. Refining/marketing operations were equally sluggish.

Both production and marketing income rose for Shell Oil, though chemical sales fell. Petroleum product sales fell 18% for Atlantic Richfield but total earnings rose 52% over same 1979 period as North Slope oil output increased. Higher prices and greater Alaskan oil output were credited for Sohio's earnings rise.

Higher worldwide prices were responsible for Standard Indiana's income gain, though lower product sales margins hurt overseas earnings.

Price increases for Texaco's U.S. oil/gas output offset lower demand for oil products and petrochemicals. Texaco had 9.3% return on average total assets.

Revenues more than doubled and income rose 50% for Getty Oil, which cited higher prices as primary factor. Nine-month earnings rose 15% for Gulf Oil though third-quarter earnings fell due to reduced product sales and lower margins. Gulf had 13.2% return on average capital invested in 12-month period compared to 12.1% in 1979.

Estimated foreign inventory profits of nearly $500 million were included in Mobil's nine-month earnings. Worldwide income was 4.6% of revenues, 6.4¢ per gallon sold; U.S. income was 4.8¢ per gallon sold.

Higher oil/gas prices more than offset lower results in refining, marketing and chemicals for Phillips Petroleum, which had 11.4% return on average capital invested. Petroleum earnings in third quarter for Standard California were 5.6% of revenues, 4.5¢ per gallon sold.

Conoco attributed third quarter earnings decline mainly to foreign operations and slumping chemical sales but year-to-date totals were better than in 1979. Conoco's net income was 5¢ on each dollar of sales.

Net income fell for American Petrofina due to lower chemical profits, though income from oil/gas production was sharply higher. Product sales rose for Clark Oil & Refining.

Union Oil of California had better chemical earnings and oil/gas production earnings, though refining/marketing margins narrowed. Pennzoil cited higher prices for oil/gas, metals and sulfur. Lower demand and margins hurt marketing income.

Higher oil/gas prices were key factor for such independents as Superior Oil, Consolidated Oil & Gas, Mitchell Energy, Patton Oil. Higher gas prices in particular ($2.80 to $3.00/Mcf for new gas) helped Amarex and Argonaut Energy.

Gas companies reported the usual slump in third quarter earnings but 12-month earnings rose 21%. Non-utility operations, especially oil/gas production, continued to be a key factor.

Liquid fuels were biggest contributor to InterNorth's 12-month income gain. Higher prices and greater sales spurred production

THIRD QUARTER NATURAL GAS COMPANIES FINANCIAL REPORTS

	Three months ending September 30**						Twelve months ending September 30**						Profit Margin‡	
	Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)				
Company	1980	1979	% Chg.	1980	1979	% Chg.	1980	1979	% Chg.	1980	1979	% Chg.	1980	1979
American Natural Resources	502,176	480,600	+ 4.5	(15,349)	(15,106)		2,866,153	2,301,751	+ 24.5	116,304	78,832	+ 47.5	4.1	3.4
Arkla Gas	205,914	178,430	+ 15.4	8,840	11,260	- 21.5	930,833	663,843	+ 40.2	75,900	61,583	+ 23.2	8.2	9.3
Coastal Corp.	1,170,402	1,009,656	+ 15.9	25,622	26,881	- 4.7	3,733,293[1]	2,967,484[1]	+ 25.8	80,603[1]	73,338[1]	+ 9.9	2.2	2.5
Columbia Gas	557,405	454,129	+ 22.7	(4,030)	(4,217)		3,472,017	2,635,393	+ 31.7	151,527	132,277	+ 14.6	4.4	5.0
Commonwealth Nat. Res.	39,214	31,094	+ 26.1	447	606	- 26.2	197,445	139,409	+ 41.6	5,973	4,825	+ 23.8	3.0	3.5
Consolidated Nat. Gas	333,244	308,598	+ 8.0	(9,508)	(995)		2,392,066	1,850,898	+ 29.2	109,405	110,118	- 0.7	4.6	6.0
El Paso Companies	882,164	832,025	+ 6.0	8,732	38,475	- 77.3	2,835,092	2,182,597	+ 29.9	49,611	110,487	- 55.1	1.7	5.1
Enserch Corp.	687,768	572,387	+ 20.2	33,613	19,664	+ 70.9	2,000,199[1]	1,640,417[1]	+ 21.9	112,700[1]	69,901[1]	+ 61.2	5.6	4.3
Equitable Gas	256,185[1]	201,502[1]	+ 27.1	24,975[1]	19,506[1]	+ 28.0	338,701	256,724	+ 31.9	32,538	23,786	+ 36.8	9.6	9.3
Houston Nat. Gas[2]							2,357,871	1,797,835	+ 31.2	196,190	136,111	+ 44.1	8.3	7.6
InterNorth	587,983	514,885	+ 14.2	14,257	19,581	- 27.2	2,905,938	2,262,271	+ 28.5	222,196	170,152	+ 30.6	7.6	7.5
Mountain Fuel Supply	67,903	58,708	+ 15.7	40	559	- 92.8	391,048	314,158	+ 24.5	31,491	20,899	+ 50.7	8.1	6.7
Northwest Energy	212,035	214,873	- 1.3	6,462	7,789	- 17.0	1,312,211	997,974	+ 31.5	49,995	39,122	+ 27.8	3.8	3.9
Oklahoma Nat. Gas	200,347	138,780	+ 44.4	5,636	3,797	+ 48.4	883,332	687,974	+ 28.4	41,168	31,196	+ 32.0	4.7	4.5
Pacific Lighting	824,805	527,073	+ 56.5	20,511	25,824	- 20.6	3,154,440	2,016,462	+ 56.4	80,185	93,096	- 13.9	2.5	4.6
Panhandle Eastern	546,623	466,607	+ 17.1	43,972	39,209	+ 12.1	1,754,091	1,417,950	+ 23.7	142,691	124,266	+ 14.8	8.1	8.8
Peoples Energy	516,399	476,042	+ 8.5	5,948	9,645	- 38.3	3,016,257	2,441,556	+ 22.5	137,564	140,228	- 1.9	4.7	5.7
Pioneer Corp.	234,666	206,083	+ 13.9	20,774	20,134	+ 3.2	880,184	660,266	+ 33.3	83,610	53,295	+ 56.9	9.5	8.1
Southern Nat. Res.	376,264	350,735	+ 7.3	36,304	26,007	+ 39.6	1,760,992	1,367,032	+ 28.8	130,019	108,782	+ 19.5	7.4	8.0
Southern Union Co.	203,887	169,998	+ 19.9	2,517	4,486	- 43.9	875,332	672,704	+ 30.1	38,783	28,112	+ 38.0	4.4	4.2
Texas Eastern Corp.	972,934	725,968	+ 34.0	44,118	40,643	+ 8.6	3,985,522	2,650,222	+ 50.4	207,076	166,103	+ 24.7	5.2	6.3
Texas Gas Trans.	504,564	401,177	+ 25.8	18,814	17,295	+ 8.8	2,099,425	1,532,142	+ 37.0	88,741	69,314	+ 28.0	4.2	4.5
Transco Companies	620,603	368,000	+ 68.6	25,191	14,428	+ 74.6	2,277,108	1,343,034	+ 69.5	103,161	59,242	+ 74.1	4.5	4.4
United Energy Res.	1,057,726	840,419	+ 25.9	38,322	33,691	+ 13.7	3,979,697	2,679,626	+ 48.5	145,500	100,260	+ 45.1	3.7	3.7
Westcoast Trans.							843,100[1]	722,800[1]	+ 16.6	37,400[1]	36,900[1]	+ 1.4	4.4	5.1
TOTALS	11,561,211	9,527,769	+ 21.3	356,208	359,162	- 1.8	51,242,327	38,202,522	+ 34.1	2,470,331	2,042,225	+ 21.0	4.8	5.3

**Excluding non-recurring items. *Earnings available to common stock. ‡Earnings/Revenue = Profit Margin. ()Loss. [1]Nine months. [2]Ends July 31.

income of Oklahoma Natural Gas, which plans to change its name to Oneok (One-oak).

Contract drilling operations were main cause of higher income for Southern Natural Resources. Regulated utility income fell for Equitable Gas but was offset by higher oil/gas and ethane sales.

Higher gas processing income due to greater margins keyed 12-month gain for Southern Union. Utility earnings fell due to lower volumes.

Pacific Lighting blamed lower utility earnings on regulatory lag and lack of gas rate increases.

Greater interstate and intrastate gas sales boosted income of United Energy Resources. Record earnings for Texas Gas Transmission were due to pipelining and inland waterways operations.

Consolidated Natural Gas expects earnings decline for full year as industrial sales have slumped due to recession. Both Consolidated and El Paso say earnings have been hurt by cutoff of LNG supplies from Algeria. Travis Petty, El Paso chairman/president, says the firm may have to write off $375 million in the "unlikely event" that the LNG project must be halted due to gas pricing disagreement.

Higher purchased gas costs, lower industrial sales made earnings fall in third quarter for Commonwealth Natural Resources, which has agreed to merge with Columbia Gas System.

THIRD QUARTER OIL COMPANY FINANCIAL REPORTS

		Three months ending September 30**						Nine months ending September 30**						Profit Margin‡	
		Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)				
	Company	1980	1979	% Chg.	1980	1979	% Chg.	1980	1979	% Chg.	1980	1979	% Chg.	1980	1979
1.	Adams Resources & Energy	52,651	50,900	+ 3.4	(20)	22		172,356	124,450	+ 38.5	(60)	36			1.5
2.	Adobe Oil	36,593	24,942	+ 46.7	5,104	3,198	+ 59.6	111,368	62,737	+ 77.5	14,441	8,218	+ 75.7	13.0	13.1
3.	Amerada Hess	1,715,992	1,572,393	+ 9.1	94,266	128,331	- 26.5	5,701,668	4,689,476	+ 21.6	433,639	388,219	+ 11.7	7.6	8.3
4.	American Petrofina	467,493	427,817	+ 9.3	28,431	37,883	- 25.0	1,485,014	1,129,678	+ 31.5	84,964	65,480	+ 29.8	5.7	5.8
5.	Argonaut Energy	903	588	+ 53.6	61	(93)		1,601	1,212	+ 32.1	71	(120)		4.4	
6.	Ashland Oil	2,213,530	1,966,342	+ 12.6	36,225	52,841	- 31.4	6,375,182	5,255,452	+ 21.3	120,410	127,939	- 5.9	1.9	2.4
7.	Atlantic Richfield	5,636,821	4,378,637	+ 28.7	389,711	320,363	+ 21.6	16,765,447	11,627,060	+ 44.2	1,253,144	822,936	+ 52.3	7.5	7.1
8.	Belco Petroleum	203,428	185,807	+ 9.5	18,239	22,930	- 20.5	614,608	441,057	+ 39.5	55,243	54,136	+ 2.0	9.0	12.3
9.	Centura Energy[4]	2,637	2,083	+ 26.6	(135)	(120)									
10.	Cities Service	1,635,400	1,601,600	+ 2.1	92,600	86,100	+ 7.5	5,621,700	4,472,500	+ 25.7	369,700	241,300	+ 53.2	6.6	5.4
11.	Clark O&R	423,452	308,064	+ 37.5	14,250	12,959	+ 10.0	1,256,893	842,998	+ 49.1	39,596	28,488	+ 39.0	3.2	3.4
12.	Commonwealth OR	341,600	332,200	+ 2.8	(6,800)	23,200		945,800	889,300	+ 6.4	(30,000)	71,300			8.0
13.	Consolidated O&G	8,244	9,734	- 15.3	1,172	57	+1956.1	24,252	24,152	+ 0.4	882	(816)		3.6	
14.	Conoco	4,500,000	3,400,000	+ 32.4	207,400	247,100	- 16.1	13,500,000	9,300,000	+ 45.2	785,600	624,700	+ 25.8	5.8	6.7
15.	Crystal Oil	70,213	46,099	+ 52.3	5,300	2,516	+110.7	189,025	111,313	+ 69.8	10,481	6,081	+ 72.3	5.5	5.5
16.	Delhi Int'l Oil	7,257	5,025	+ 44.4	1,767	1,332	+ 32.7	19,739	12,275	+ 60.8	4,319	2,712	+ 59.3	21.9	22.1
17.	Diamond Shamrock	773,159	606,247	+ 27.5	42,696	37,122	+ 15.0	2,297,620	1,685,477	+ 36.3	155,297	119,616	+ 29.8	6.8	7.1
18.	Dorchester Gas[6]	154,842	125,399	+ 23.5	9,704	10,014	- 3.1	608,760[1]	368,267[1]	+ 65.3	34,919[1]	25,152[1]	+ 38.8	5.7	6.8
19.	Dyco Petroleum	8,071	6,330	+ 27.5	2,058	1,493	+ 37.8	21,033	14,936	+ 40.8	5,588	3,276	+ 70.6	26.7	21.9
20.	Earth Resources	327,368	134,747	+ 76.1	12,850	6,514	+ 97.3	468,336	226,201	+107.0	20,874	11,124	+ 87.6	4.5	4.9
21.	Energy Reserves Group	37,473	28,005	+ 33.8	2,757	2,284	+ 20.7	110,682	68,601	+ 61.3	16,375	10,218	+ 60.3	14.8	14.9
22.	Equity Oil	4,993	2,982	+ 67.4	1,248	850	+ 46.8	11,962	8,433	+ 41.8	3,037	2,018	+ 50.5	25.4	23.9
23.	Exxon	26,745,000	21,681,000	+ 23.4	1,355,000	1,145,000	+ 18.3	80,622,000	59,148,000	+ 36.3	4,310,000	2,930,000	+ 47.1	5.3	5.0
24.	Felmont	15,335	10,834	+ 41.5	3,764	2,252	+ 67.1	42,223	30,021	+ 40.6	11,714	6,524	+ 79.6	27.7	21.7
25.	Forest	22,414	17,328	+ 29.4	1,504	1,252	+ 20.1	65,741	49,342	+ 38.2	4,165	3,787	+ 10.0	6.0	8.0
26.	Galaxy Oil[6]	2,797	1,903	+ 47.0	98	(507)		5,590[2]	3,448[2]	+ 62.1	135[2]	(337)[2]		2.4	
27.	Getty Oil	2,558,560	1,329,297	+ 92.5	191,555	173,877	+ 10.2	7,470,577	3,574,213	+109.0	659,990	421,033	+ 56.8	8.8	11.8
28.	Gulf Oil Corp.	6,631,000	6,736,000	- 1.6	244,000	416,000	- 41.4	21,187,000	18,410,000	+ 15.1	1,003,000	956,000	+ 4.9	4.7	5.2
29.	Hudson Petroleum	3,095	1,938	+ 59.7	1,115	764	+ 45.9	8,492	4,477	+ 47.3	2,687	1,238	+ 53.9	31.6	27.6
30.	Holly Corp.[5]	99,939	79,388	+ 25.9	1,675	1,527	+ 9.7	197,253[2]	144,017[2]	+ 37.0	2,907[2]	3,227[2]	- 9.9	14.8	22.4
31.	Howell Corp.	64,277	125,297	- 48.7	424	10,318	- 96.0	203,309	252,301	- 19.4	10,949	21,032	- 47.9	5.4	8.3
32.	Howell Petroleum	5,912			1,019			14,919			1,966			13.2	
33.	Inexco Oil	39,689	27,752	+ 43.0	6,037	4,534	+ 33.1	107,386	73,498	+ 46.1	17,386	12,132	+ 43.3	16.2	16.5
34.	Juniper Petroleum	5,497	4,473	+ 22.9	595	621	- 4.2	11,283[2]	8,334[2]	+ 35.4	1,151[2]	937[2]	+ 22.8	10.2	11.2
35.	KRM Petroleum	1,047	952	+ 10.0	137	284	- 51.8	3,449	2,039	+ 69.2	712	313	+127.5	20.6	15.4
36.	Lear Petroleum	24,308	22,938	+ 6.0	947	1,767	- 46.4	89,855[1]	78,314[1]	+ 14.7	6,287[1]	5,007[1]	+ 25.6	7.0	6.4
37.	Louisiana L&E	247,281	203,057	+ 21.8	37,510	37,691	- 99.5	770,671	570,662	+ 35.0	131,935	124,731	+ 5.8	17.1	21.9
38.	Marion	95,175	72,777	+ 30.8	6,149	5,463	+ 12.6	232,428	169,888	+ 36.8	11,105	11,711	- 5.2	4.8	6.9
39.	Mapco Inc.	177,703	210,508	- 15.6	16,997	16,539	+ 2.8	615,152	552,354	+ 11.4	60,040	47,862	+ 25.4	9.8	8.7
40.	Marathon Oil	2,028,189	1,913,635	+ 6.0	76,347	79,656	- 4.2	6,333,450	4,979,235	+ 27.2	323,743	268,961	+ 20.4	5.1	5.4
41.	McRae Consolidated[3]	28,115	26,688	+ 5.3	1,407	1,767	- 20.3	90,224	66,014	+ 36.6	8,989	3,511	+156.0	9.9	5.3
42.	Mesa Petroleum	78,697	69,318	+ 13.5	15,324	12,172	+ 25.9	268,802	182,004	+ 47.7	58,315	37,843	+ 54.1	21.7	20.8
43.	Mobil Corp.	15,662,618	12,366,784	+ 26.7	720,999	601,597	+ 19.8	46,337,781	33,476,994	+ 38.4	2,254,459	1,468,942	+ 53.5	4.9	4.4
44.	Murphy Oil	455,615	452,235	+ 0.7	40,914	28,625	+ 42.9	1,479,698	1,179,021	+ 25.5	104,937	63,960	+ 64.1	7.1	5.4
45.	Natomas	348,428	259,369	+ 34.3	58,873	32,680	+ 80.1	1,032,111	726,805	+ 42.0	164,287	76,606	+144.5	15.9	10.5
45.	Noble Affiliates	70,466	54,736	+ 28.7	8,558	8,992	- 4.8	205,315	151,896	+ 35.2	34,107	21,871	+ 55.9	16.6	14.4
47.	Norris Oil	284	170	+ 67.1	20	(6)		835	347	+139.2	57	(127)		6.8	
48.	Occidental Petroleum	2,951,000	2,608,000	+ 13.2	126,000	146,000	- 13.7	9,296,500	6,688,200	+ 39.0	458,900	317,000	+ 73.2	5.9	4.7
49.	Ocean O&G	18,897	15,519	+ 21.8	3,601	2,856	+ 26.1	57,585	39,562	+ 45.6	11,199	5,824	+ 92.3	19.4	14.7
50.	Pacific Resources	214,490	158,178	+ 35.6	4,188	3,554	+ 17.8	601,433	381,753	+ 57.5	18,089	8,717	+107.5	3.0	2.3
51.	Pennzoil Co.	579,692	521,966	+ 11.1	68,649	59,978	+ 14.4	1,823,595	1,448,629	+ 25.9	227,692	161,781	+ 40.7	12.5	11.2
52.	Sabine Corp.	31,046	23,052	+ 34.7	6,281	3,397	+ 84.9	53,305	42,283	+ 26.1	11,785	4,199	+180.6	22.1	9.9
53.	Phillips Petroleum	3,224,129	2,496,015	+ 29.2	283,378	193,027	+ 46.8	9,838,461	6,699,961	+ 46.8	782,641	584,630	+ 33.9	8.0	8.7
54.	Quaker State	214,676	175,056	+ 22.6	5,937	7,950	- 25.3	610,427	513,147	+ 19.0	20,312	29,057	- 30.1	3.3	5.7
55.	Shell Oil	5,135,000	3,766,000	+ 36.4	353,000	293,000	+ 20.5	14,828,000	10,245,000	+ 44.7	1,133,000	794,000	+ 42.7	7.6	7.8
56.	Southland Royalty	94,109	67,552	+ 39.3	18,179	15,883	+ 14.5	277,080	180,381	+ 53.6	52,365	37,790	+ 38.6	18.9	2.1
57.	Standard California	10,508,822	8,137,459	+ 29.1	623,656	535,222	+ 16.5	31,605,370	22,070,037	+ 43.2	1,785,694	1,261,408	+ 41.6	5.6	5.7
58.	Standard Indiana	6,500,000	5,100,000	+ 27.5	448,900	437,700	+ 2.6	20,100,000	14,100,000	+ 42.6	1,513,100	1,137,900	+ 33.0	7.5	8.1
59.	Sundance Oil	4,500	3,441	+ 31.8	(1,498)	(2,557)		12,415	10,430	+ 19.0	(6,334)	(4,162)			
60.	Standard Ohio	2,542,700	2,097,800	+ 21.2	433,400	366,200	+ 18.4	8,042,000	5,566,300	+ 44.5	1,335,400	705,100	+ 89.4	16.6	12.7
61.	Sun Co.	3,000,000	2,700,000	+ 11.1	194,900	181,900	+ 7.2	9,100,000	7,600,000	+ 19.7	693,000	477,000	+ 45.3	7.6	6.3
62.	Superior Oil	376,070	304,640	+ 23.4	78,054	63,688	+ 22.6	1,056,975	782,769	+ 35.0	237,255	152,605	+ 55.5	22.4	19.5
63.	Texas American	33,073	30,967	+ 6.8	759	477	+ 59.1	99,289	80,293	+ 23.7	1,966	2,054	- 4.3	2.0	2.6
64.	Supron Energy	15,040	12,000	+ 25.3	4,362	3,385	+ 28.8	46,287	34,089	+ 35.8	13,687	9,658	+ 41.7	29.6	28.3
65.	Tenneco	3,068,000	2,789,000	+ 10.0	162,000	131,000	+ 23.7	9,585,000	7,940,000	+ 20.7	526,000	407,000	+ 29.2	5.5	5.1
66.	Texaco Inc.	12,625,000	10,222,200	+ 23.5	636,400	583,700	+ 9.0	38,411,200	27,083,300	+ 41.8	1,739,900	1,225,100	+ 42.0	4.5	4.5
67.	Texas International	25,494	9,007	+183.3	5,555	(5,005)		57,949	28,085	+106.3	12,015	(5,859)		20.7	
68.	Texas Oil & Gas[6]	324,293	256,425	+ 26.4	39,824	28,173	+ 41.3	628,149[2]	508,565[2]	+ 23.5	77,074[2]	54,040[2]	+ 42.6	12.2	10.6
69.	Tosco Corp.	574,173	574,142		9,321	23,589	- 60.1	1,706,599	1,373,052	+ 24.3	55,933	53,472	+ 4.6	5.3	3.9
70.	Total Petroleum N.A.	313,548	251,600	+ 24.6	12,534	9,124	+ 37.4	954,668	631,042	+ 51.3	35,432	18,445	+ 92.1	3.7	2.9
71.	Transcontinental Oil	19,615	15,879	+ 23.5	691	(1,035)		58,113	45,902	+ 26.6	2,116	(3,536)		3.6	
72.	Tribune Oil	447	358	+ 24.9	132	127	+ 3.9	1,383	892	+ 55.0	465	275	+ 69.1	33.6	30.8
73.	Union California	2,630,134	2,143,866	+ 22.7	122,012	105,953	+ 15.2	7,757,138	5,771,624	+ 34.4	469,751	348,299	+ 34.9	6.1	6.0
74.	United Refining	167,103	138,962	+ 20.3	1,551	6,305	- 75.4	482,737	352,568	+ 36.9	5,945	13,009	- 54.3	1.2	3.7
75.	Universal Resources[5]	8,584	6,153	+ 39.5	2,016	602	+234.9	27,497	17,581	+ 56.4	5,171	1,832	+182.3	18.8	10.4
76.	Williams Companies	519,849	442,183	+ 17.6	28,197	11,868	+137.6	1,573,697	1,389,913	+ 13.2	115,598	46,027	+151.2	7.3	3.3
77.	Woods Petroleum	14,072	11,041	+ 27.5	4,043	3,370	+ 20.0	38,920	31,321	+ 24.3	10,419	9,108	+ 14.4	26.8	29.1
	TOTALS	129,677,108	105,962,779	+ 22.6	7,425,875	6,789,192	+ 9.4	392,430,360	286,845,478	+ 36.8	23,909,113	16,950,550	+ 41.1	6.1	5.9

**Excluding non-recurring items. *Earnings available to common. ‡ Profit Margin=Earnings* ÷ Revenues. [1]Twelve months. [2]Six months. [3]Ends May 31. [4]Ends June 30. [5]Ends July 31. [6]Ends August 31.

NOTE

ONLY THE FOLLOWING PAGES OF THIS

PUBLICATION HAVE BEEN FILMED

Cover 1, p. 3-4, 21-24, 26,

EM 4, EM 7.